

Attachment F
Research Proposal Template
Roads & Highways Monitoring Committee
Subgroup of the Stormwater Working Group

1. RESEARCH PROPOSAL TITLE

Design of water quality monitoring to address temporal variability of road runoff

2. RESEARCH PROBLEM DESCRIPTION

The concentration of pollutants in road runoff varies in time depending on a number of factors including the amount and timing of precipitation and pollutant sources. Continuous or even frequent roadside water quality monitoring is prohibitively expensive in most situations, so monitoring design is critical to collect water quality information efficiently. While runoff after prolonged dry periods can contribute high loads and contribute to acute water quality problems in some regions, this "first-flush" phenomenon may be less important in humid regions like western Washington without prolonged dry periods.

3. RESEARCH OBJECTIVE

Develop a hierarchical design for monitoring road runoff that acknowledges and, to the extent possible, addresses the temporal variability. The design hierarchy would be structured around increasing monitoring effort where the sampling strategy at each tier in the hierarchy would aim to resolve an appropriate level of detail regarding the temporal variability of water quality (e.g., "typical" storm event concentrations may be possible to obtain from a low level of effort, while maximum concentrations may require substantially more effort).

☐ Effectiveness ☒ Source Identification ☐ Status & Trends

4. LITERATURE SEARCH AND RESEARCH IN PROGRESS SUMMARY

Refer to "Untreated highway runoff in western Washington" (Herrera 2007) for potentially relevant data sets.

5. Geographic Scope and Urgency of Research

How broadly will the results of this research apply? The framework and method could be applied nationally, streams where roads are significant contributor to water quality degradation would be identified for Washington.

☒ Nationally ☐ Pacific Northwest ☐ WA Only ☐ Eastern WA ☐ Western WA ☐ Puget Sound Basin

How quickly will you need the results of this research?

☐ ASAP ☐ Within 6 months ☐ Within 1 year ☐ Within 2 years ☐ Within 5 years ☒ Ongoing

6. Conceptual Research Approach

Development of a monitoring strategy would require high frequency information on water quality parameters of interest in road runoff. It is likely that data are available for some parameters and these may serve as a surrogate for broader classes of compounds. The initial analysis would evaluate the magnitude of temporal variability (e.g., observed range in concentrations at a site) and its predictability (e.g., flow-dependent, seasonal, timing) for available parameters. A primary aspect of the initial analysis would also involve an assessment of whether the associated degradation in water quality has a temporal dependency that may not be dictated by the temporal distributions of concentrations or loads (e.g., temperature or metals that affect aquatic species at specific life stages). There will likely be a number of compounds that lack high frequency data sets and are not well represented by surrogate compounds with high frequency data sets. Field sampling would be required to incorporate these compounds in the monitoring strategy. Likewise, compounds or parameters that do not have predictable temporal variability could also be appropriate subjects for a high frequency field sampling effort.

7. ESTIMATED COST AND TIMING (Optional)

The initial analysis and design would be based on a literature review and could probably be completed in one year for \$50,000. Adding high frequency field sampling with associated laboratory analysis of the samples for constituents of interest would increase the cost substantially and extend the project to at least three years to allow for planning, implementation,

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and analysis.

8. CONTACT INFORMATION

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